UNIVERSITY OF SWAZILAND

FACULTY OF EDUCATION

SUPPLEMENTARY EXAMINATION PAPER 2010

B. Ed. II and PGCE

July 2010

Title of paper: Curriculum Studies: Chemistry

Course number: EDC 279

Time allowed: 3 hours

Instructions:

1. This paper contains FIVE questions.
2. Question 1 is COMPULSORY. You may then choose ANY TWO questions from questions 2, 3, 4, 5.
3. Marks for each question are indicated at the end of the question.
4. Any piece of material or work which is not intended for marking purposes should be clearly CROSSED OUT.
5. Ensure that responses to questions are NUMBERED CORRECTLY.
6. This paper comprises 5 pages

Special Requirements

SGCSE Physical Science syllabus 6888 (Chemistry section)
Selected Textbook chapters/pages

SECTION A

QUESTION 1

This question is compulsory

a) When designing a lesson plan the following components need to be carefully considered:

- Introduction
- Conclusion
- Time allocated to each step of the lesson.

What is the significance of **each** of these parts of the lesson plan? [12)

b) Standard practical work and guided discovery are some of the approaches that can be used to conduct chemistry practical work.

Discuss these two approaches to practical work and show their role in teaching chemistry effectively. [18]

c) Science and teaching about science in schools involves **scientific knowledge**, **processes of science** and **scientific attitudes**. Explain, with the help of at least **two** examples from chemistry what each of the above terms involve. [10]

SECTION B

Choose and answer any two questions

QUESTION 2

a) Scientific papers are a way by which scientists document and communicate their work. However, Medawar (1963) argues that scientific papers may give a distorted account of scientific investigations.

Briefly discuss Medawar's concerns about the scientific paper and indicate why he thinks the way scientific papers presents scientific work may be distorted. [10]

b) The inclusion of science in the school curriculum can be justified on the basis of intrinsic and extrinsic values. Discuss these values and illustrate your discussion with examples from chemistry. [20]

QUESTION 3

a) The question and answer method is a versatile technique in teaching as it permeates most of the other methods of teaching. Questions used in the question and answer method may be classified as **convergent, divergent** or **evaluative** questions.

Describe the characteristics of each of the three classes of questions and give two examples for each from chemistry. [20]

b) Suppose you want to use the demonstration method to teach the concepts "exothermic reactions" and "endothermic reactions". How might you go about using this method to ensure pupils learn these concepts? (You may use the attached information sheet from Lewis, M. and Waller, G. (1980). *Thinking Chemistry*: Energy changes in chemical reactions) [10]

QUESTION 4

a) Formative and summative assessments are important for chemistry education. Discuss the functions of each and their role in chemistry teaching and learning. [20]

b) Assessment of learners' learning may motivate learners to work hard on many occasions. Discuss how motivation through assessment may be achieved. [10]

QUESTION 5

a) Developing a detailed scheme of work is part of planning for instruction.

i) What is a scheme of work? [3]

ii) What are the benefits of developing a detailed scheme of work for a chemistry teacher? [10]

b) Planning for a lesson involves writing out a plan of the lesson as well as planning for other "things" that may be required and events that may arise during the lesson. What other things should a teacher plan for without indicating them in the lesson plan? [17]

21 Energy changes in chemical reactions

21.1 Exothermic and endothermic reactions

Chemical change

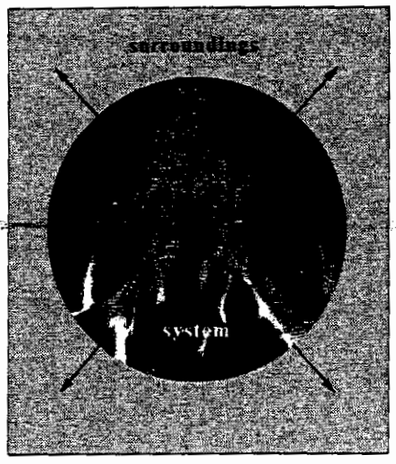
We first introduced the properties of chemical change in Chapter 4. The three major observations made about all chemical changes are:

(i) A new substance is produced. Reactants ⟶ products.
(ii) The amounts of reactants and products are in fixed ratio.
(iii) There is an energy exchange with the surroundings.

Read pages 32 and 33 again to remind yourself in more detail about the properties of chemical change.

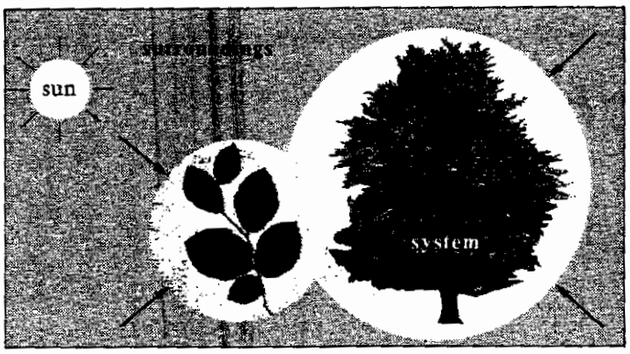
Systems and surroundings

The coal on a fire reacts with the oxygen in the air and heats up the surroundings:

System and surroundings	*Energy exchange*
	From system to surroundings

This is an example of an **exothermic** reaction. 'Exo' comes from Greek and means 'out'. Energy is given out by the reacting system.

Trees grow by a chemical change. Carbon dioxide from the air combines with water to make new cells. This reaction is called **photosynthesis** and needs the energy from the sun to make it work:

System and surroundings	*Energy exchange*
	From surroundings to system

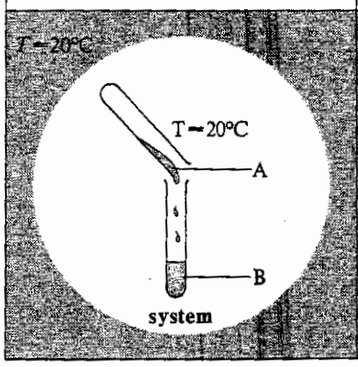
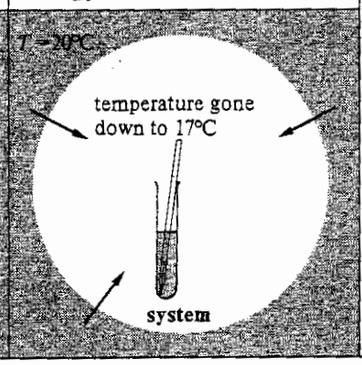
This is an example of an **endothermic** reaction. 'Endo' also comes from Greek and means 'in'. Energy is taken in by the system.

The energy taken in and given out can be in different forms:

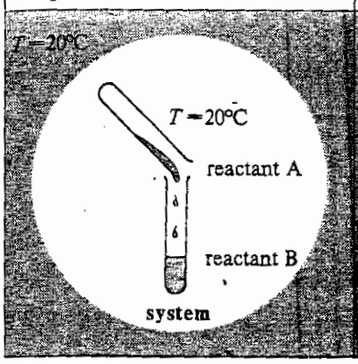
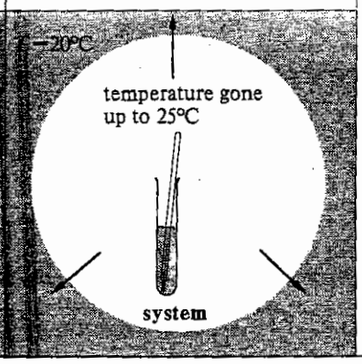
heat energy, e.g.	taken in by a system warmed over a bunsen; given out by a coal fire.
electrical energy, e.g.	taken in during electrolysis; given out by the reaction in a battery.
light energy, e.g.	taken in during photosynthesis; given out when potassium metal reacts with water.

In the laboratory we are usually concerned with heat energy. Chemical reactions often occur between reactants dissolved in solution: we can tell whether they are exothermic or endothermic simply by using a thermometer. This is shown in the two experiments that follow.

Experiment 1

1 The system and surroundings are at the same temperature.	2 The system is now colder than the surroundings.	The reaction has made the temperature of the system go down. The energy exchange is from surroundings to system, ∴ the reaction is *endothermic*.
		Example: A—magnesium chloride B—sodium carbonate.

Experiment 2

1 The system and surroundings are at the same temperature.	2 The system is now hotter than the surroundings.	The reaction has made the temperature of the system go up. The energy exchange is from system to surroundings, ∴ the reaction is *exothermic*.
		Example: A—sulphuric acid B—sodium hydroxide.